

A Revision of *Eriochlamys* (Asteraceae, Gnaphalieae)

Neville G. Walsh

National Herbarium of Victoria, Royal Botanic Gardens, Birdwood Avenue, South Yarra
3141, Australia

Abstract

Eriochlamys Sond. & F. Muell., currently with one named species *E. behrii*, is revised and three new species *E. cupularis*, *E. eremaea* and *E. squamata* are described, illustrated and mapped.

Introduction

In the original description of *Eriochlamys* the presence of capitula aggregated into subglobose heads was emphasised as a diagnostic character for the genus (Sonder 1853). The unreliability of employing the presence of compound heads as a key character for the genus was intimated by Bentham (1867, 1873) when he included the genus in the subtribe Helichryseae rather than in the Angiantheae (= Angianthinae) where the genus is currently placed. Bentham's concept of the Helichryseae had the flower heads *distinct*, i.e. *not* aggregated into compound heads that he regarded as characteristic of the Angianthinae. Short (1983) commented on the 'artificiality ... of the use of the compound head as a criterion for subtribal recognition' and cited *Eriochlamys* as an example where the heads may be single or aggregated into compound heads. He further recommended that subtribe Angianthinae be subsumed into a broader Gnaphaliinae. Subsequent authors (e.g. Anderberg 1991, Bremer 1994) have recognised the Angianthinae as distinct and placed *Eriochlamys* therein (as did Black, 1929). In circumscribing the Angianthinae, these authors apparently employed details of the anthers and cypselas rather than merely the aggregation of the capitula into compound heads. In a cladistic analysis using morphological characters, Anderberg (1991) identified the Angianthinae as a basal, well-supported clade of 51 genera, mainly with relatively large, often colourful capitula (e.g. *Schoenia* Steetz, *Xerochrysum* Tzvelev, (syn. *Bractcantha* A. Anderb), *Waitzia* Wendl.), and an 'Angianthus' group, including *Eriochlamys* with 23 other genera of mainly small annuals with reduced, often aggregated capitula. *Eriochlamys* is included in a small clade of three genera, sister to *Hyalochlamys* Gray and *Gnephosis* Cass. all of which share the character of a reduced or missing pappus. However, a more recent assessment of the Australian Gnaphalieae based on chloroplast and nuclear sequences (Bayer et al. 2002) shows that the Angianthinae and Cassiniinae do not form monophyletic groups, supporting Short's assertion. Indeed the cladogram suggests that *Eriochlamys* is sister to *Ammobium* R.Br. and *Argyrolottis* Turcz. and belongs in a clade that includes the somewhat woody perennial genera *Apalochlamydis* Cass., *Calomeria* Vent., *Odixia* Orchard and *Ozothamnus* R.Br., rather than the reduced annuals that Anderberg's classification suggested. These conflicting and perhaps surprising results make it difficult to speculate on the relationships of *Eriochlamys*. Nonetheless, considering the uniform structure of the individual capitula, the florets and the fruits of the taxa treated below, it seems certain that they are truly congeneric.

While only one species of *Eriochlamys* – *E. behrii* – is currently formally recognised, recent flora treatments (Brown 1992, Jeanes 1999) have indicated that a second, unnamed, species exists. Whereas *Eriochlamys behrii* accords with Sonder's concept of the genus (with capitula aggregated into subglobose heads), the second species does not, being

described as having capitula 'simple' (Brown 1992) or 'solitary or up to 5 in groups, but remaining discrete' (Jeanes 1999). In the process of accumulating specimens to formalise the publication of the unnamed species, it became clear that two further, essentially allopatric, species also occur in central Australia (Western Australia, Northern Territory and South Australia) and an area to the east of this in southern Queensland and northern New South Wales. A revision of the genus is presented below. With the exception of the treatments cited above, all the species here recognised have been previously incorporated under the name *E. behrii* in State and regional floras and checklists.

Taxonomy

Eriochlamys Sond. & F. Muell. in Sond., *Linnaea* 25: 488 (1853)

Type *E. behrii* Sond. & F. Muell.

Small ascending to erect, wiry, aromatic annual herbs. Leaves cauline, sessile, alternate or some opposite toward base, entire. Capitula sessile, terminal, simple or in compound heads, or sometimes initially clustered but elongating and becoming spike-like; involucre bracts 2–several-seriate, unequal, outer ones herbaceous, leaf-like, often cottony, inner ones scarious and glabrous or sparsely cottony; receptacle hemispherical to conical, tuberculate, naked. Florets numerous, bisexual, tubular, yellow; corolla deeply 5-lobed; anthers tailed at base, with acute apical appendages; style bilobed, with linear branches, truncate and papillose at apex. Cypselas more or less obovoid, terete or slightly compressed, brown, epidermis minutely papillose, developing a thinly inflated transparent layer on hydration; carpopodium present, a complete annulus with cells outlines just detectable, the cells much smaller than the adjacent epidermal cells of the cypselas; pappus absent.

Although Anderberg (1991, p. 129) described the receptacle as flat, in all species it is domed to conical.

Four species, endemic to mainland Australia.

Key to species

1. Corolla tube \leq 1 mm long; capitula initially gathered together, but the inflorescence often elongating and becoming spike-like. Largest leaves usually more than 10 mm long and 1 mm wide, at least some with margins merely recurved (not revolute) and the abaxial lamina exposed to some degree. SA, NT, WA..... **2. *E. eremaea***
1. Corolla tube at least 1.1 mm long; capitula solitary or variously aggregated at tips of branchlets but never growing out into a spike-like inflorescence. Leaves rarely larger than 10 mm long and 1 mm wide and abaxial lamina hidden by the revolute margins **2**
 2. Capitula remaining in subglobose compound heads, individual capitula and/or outer bracts obscured by dense woolly hairs SA, NSW, Vic..... **1. *E. behrii***
 2. Capitula solitary, sometimes in closely contracted few-flowered cymes but always separable at least at fruiting stage, individual capitula and bracts not obscured by woolly hairs **3**
 3. Outer bracts rhombic or narrowly ovate (broadest near the middle), the thickened or recurved margins not obscuring abaxial surface, distinctly shorter than the involucre, graduating in size and shape across several series from the leaves to the elliptic inner bracts, imparting a scaly appearance to the capitula. NSW, Vic. **3. *E. squamata***

3. Outer bracts c. linear or narrowly lanceolate, leaf-like, margins revolute, obscuring abaxial surface, subequal to or even shortly exceeding involucre, with a sudden transition in shape to the elliptic inner bracts; heads not appearing scaly. SA, Qld, NSW4. *E. cupularis*

1. *Eriochlamys behrri* Sond. & F. Muell. in Sond., *Linnaea* 25: 488 (1853).

Type: 'In solo argillacco in planitie inter Saltercreek et Pine forest Novemb. Dr. Behr' (lecto (here chosen): MEL 542222; isolecto: MEL 542223. Residual syntypes: Dombey-[=Tumby] bay', s.d., F. Mueller: MEL 542220, MEL 542221).

Ascending to erect annual, 4–12(–20) cm high, stems branched at base and/or above; stems white-cottony on new growth, older stems glabrescent. Leaves linear to narrowly clavate, 3–11 mm long and 0.3–1.0 mm wide, narrowly to widely spreading from stem, acute to obtuse, base shortly decurrent, margins revolute, entirely obscuring the abaxial surface, adaxial surface glabrous or with scattered sessile glands, abaxial midrib usually with spreading cottony hairs and sessile glands near base. Capitula (1–)2–5(–8) together in terminal globose heads 4–10 mm diam., the individual capitula embedded in and often obscured by the copious long white cottony hairs of bracts; bracts subtending the compound head leaf-like, in 1–3 series, becoming shorter and broader toward the inner series; bracts of individual capitula in 2 or 3 series, 2–3 mm long, the outer ones obovate to broad-ovate, 2–3 mm long, entirely herbaceous or with a short ruminant membranous apex, abaxially densely white-cottony, adaxially glabrous, inner bracts broad-oblong, with broad hyaline margins and green stroma about half as long and wide as the entire bract, glabrous or with a few cottony hairs, glandular on proximal abaxial surface, apex ruminant, usually sparsely ciliate. Florets 20–40 per capitulum, slightly exceeding involucre at maturity; tubular part of corolla 1.5–2 mm long with scattered glands and cottony hairs concentrated proximally and distally; lobes spreading to recurved, c. 0.4 mm long. Cypselas obovoid, rounded to truncate apically, usually slightly flattened, 0.5–0.6 mm long, 0.3–0.4 mm wide. (Figs 2a, 3).

Representative specimens (94 specimens examined): SOUTH AUSTRALIA. Clare Village, xi.1882, L. Wehl s.n. (MEL); Tareoola, 21.ix.1920, E.H. Ising 1731 (AD); Canegrass, c. 60 km NNE of Morgan, 20.ix.1937, E.H. Ising s.n. (AD); Eyre Peninsula, Gawler Range, 14.xi.1958, R.L. Specht 2 & B.B. Carrodus (AD); Eyre Peninsula, Hundred of Blessing, 3.x.1967, J.R. Wheeler 551a (AD); c. 400 m west of Hesso, 9.xii.1978, P. Short 833 (AD, MEL); 16 km S of Coorabie 24.x.1983, H.R. Toelken 7732 (AD); Venus Bay, 19.xi.1979, P.J. Heyligers 79152 (AD, CANB); Kangaroo Island, Dudley Peninsula, 18.xi.1988, B.M. Overton 929 (AD); Boomerang Island, Lake Gairdner, 10.iv.1993, R. Bates 32146 (AD); Yorke Peninsula, s.d. Tepper s.n. (MEL); 16.7 km N of Port Augusta, 14.x.1995, K. Watanabe 316 (AD, MEL, TI); Flinders Ranges, Tareowie Common, 12.i.1993, R.J. Bates 30744 (AD, MEL). NEW SOUTH WALES. Between the Lachlan and Darling Rivers, 1885, J. Bruckner s.n. (MEL); Junction of the Darling and Murray R., x.1887, J. Minchin s.n. (MEL). VICTORIA. Murrayville, 31.xii.1916, H.B. Williamson s.n. (MEL); Hattah Lakes National Park, Lendrook Plain, 3.x.1960, A.C. Beanglehole 39393 (MEL); Sunset Country, edge of Raak Plain, 12.x.1977, D.J. Cummings 233 (AD, CANB); 21 km SW of Morkalla, 28.x.1977, A.C. Beanglehole 56979 (MEL); Edge of Lake Tyrell, 19.viii.1996, S. Garner 320 (MEL); Neds Corner Station, 10.x.2003, N.G. Walsh 5803 (MEL).

Distribution and Conservation Status: Occurs in from about Ceduna in South Australia to north-western Victoria and into southern New South Wales as far north as around Bourke, within IBRA regions Eyre York Block, Kanmantoo, Flinders Lofly Block and Murray Darling Depression (Environment Australia 2000). Sometimes co-extensive with *E. squamatus*, but generally occurring to the west of that species. (Fig. 1). Not regarded

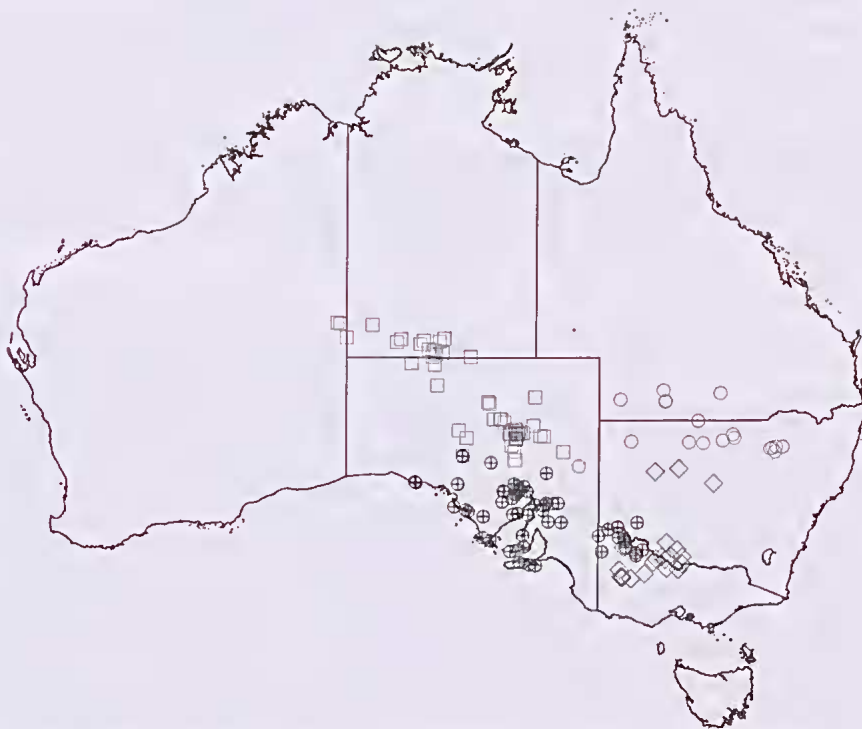


Figure 1. Distribution of *Eriochlamys* based on herbarium records. ⊕ *E. behrii*; □ *E. eremaea*; ◇ *E. squamata*; ○ *E. cupularis*

as rare or threatened *sensu* Briggs & Leigh (1996). Regarded as of 'Least Concern' (LC) *sensu* IUCN (2001).

Habitat: Usually occurring on areas prone to shallow inundation (e.g. ephemeral watercourses, lake margins, run-ons), sometimes slightly to moderately saline. Also occurring on sandy soils, including those of near-coastal areas where sometimes overlying limestone. Collector's notes record associations with chenopod shrublands and low coastal serubs.

Phenology: Flowers mainly August to January.

Notes: Tupper (1978) noted that *E. behrii* increased under elevated levels of grazing by sheep at the expense of palatable species such as *Austroanthonia caespitosa* (Gaudich.) H.P. Linder and *Austrostipa scabra* (Lindl.) S.W.L. Jacobs & J. Everett. The work was carried out in the Riverine Plain of southern New South Wales. However it is possible that either *E. behrii* or *E. squamata* was the species observed in the study.

In the protologue, localities for the species are cited 'In solo argillaceo in planitie inter Salterreek et Pine forest Novemb. Dr. Behr. Dombey-bay'. Although a collector is not given for the Dombey [Tumby] Bay collection, material at MEL suggests this collection (on two sheets, MEL 542220, MEL 542221) is one of Mueller's. It is undated, but other Mueller collections from the same locality at MEL were collected in either December 1851 or January 1852. There are two sheets containing Behr material at MEL (542222, 542223), both mentioning Salt Creek and Pine Forest, and both dated November 1849.

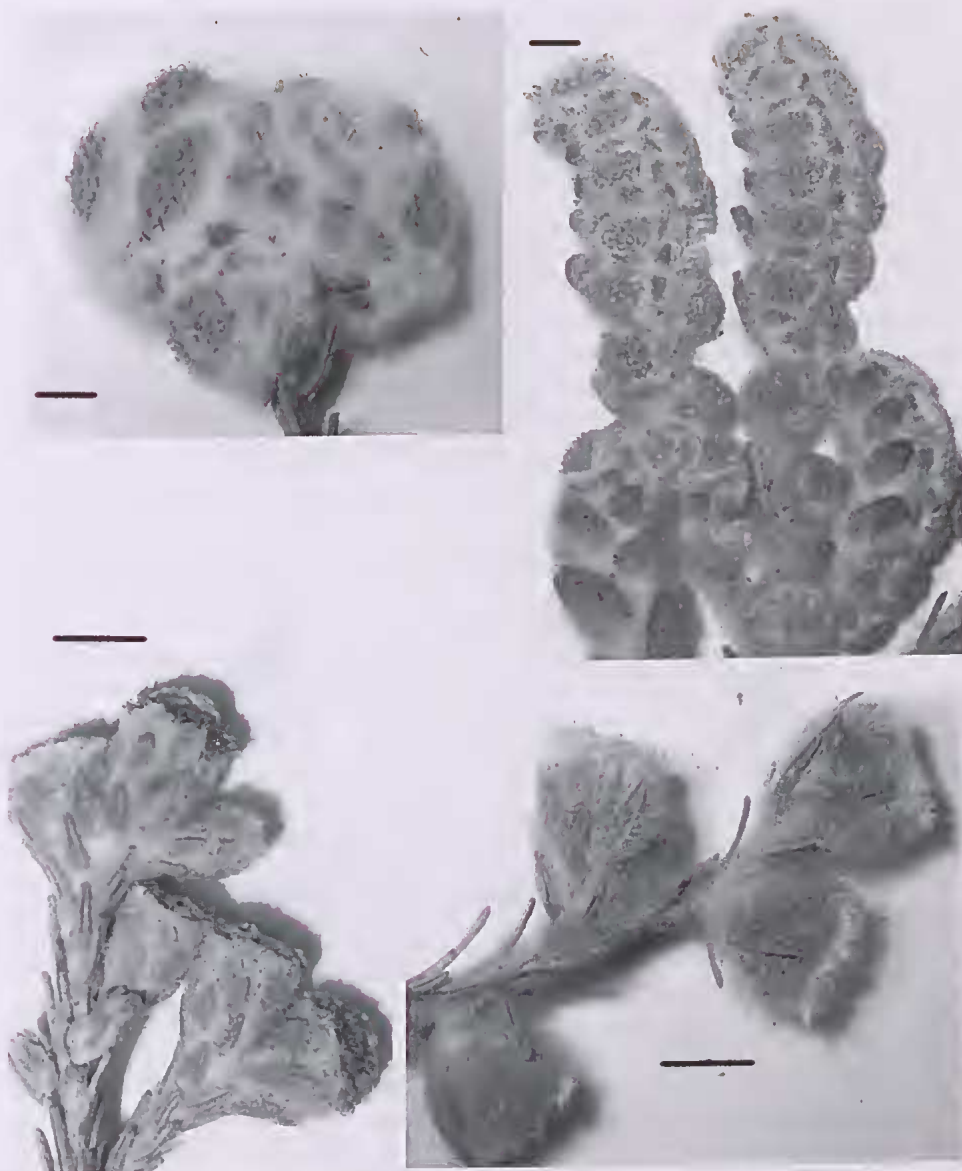


Figure 2. Capitula of *Eriochlamys*. Scale bar = 2 mm throughout. a. *E. behrii* from Toelken 7732 (AD); b. *E. eremaea* from Nordenstam & Anderberg 901 (MEL); c. *E. squamata* from Garner 319 (MEL); d. *E. cupularis* from Bean 14483 (holotype, MEL).

One of these sheets (MEL 542223) includes Behr's label with the site description in German matching that of the Latin in the protologue and a brief generic description in Sonder's hand on which the description in *Linnaea* appears to be based. As well as these labels there is one of Mueller's with '*Eriochlamys pertusa* Ferd. Muell', with the epithet crossed through and replaced with '*behrii* S & M', the initials undoubtedly standing for Sonder and Mueller (there are occasional specimens at MEL where Mueller's *E. pertusa* determination persists). The other sheet with Behr material (MEL 542222) appears to be



Figure 3. Lectotype of *Eriochlamys behrri*

a mixture: there are two plants and two labels, one of Behr's, the other a Mueller label from the Murray River collected in 1853. It is not indicated which element corresponds with which. The former of the sheets has been chosen as the lectotype, while the latter is regarded *pro parte* as an isolectotype. The Mueller collections from Dombey [Tumbey] Bay (MEL 542220, 542221) are regarded as residual syntypes.

2. *Eriochlamys eremaea* N.G. Walsh sp. nov.

Ab aliis speciebus generis tubo corollae breviorie (sub 1 mm longo), foliis majoribus, inflorescentia saepe subspicata et distributione cremico differt.

Type: South Australia. Region 2: Lake Eyre Basin. Edwards Creek. David's Bore, 12.ix.1986, *J.Z. Weber 9460* (holo: AD; iso: MEL, NSW).

Decumbent, ascending or erect annual, 5–12(–17) cm high, often with multiple major axes branching from near base; stems white-cottony on newer growth, usually glabrescent on older parts. Leaves oblong to linear, 6–17 mm long, 0.8–2.5 mm wide, usually slightly dilated at base, narrowly to widely spreading from stem, obtuse or rounded, base shortly decurrent, margins recurved to revolute, obscuring the abaxial surface or slightly exposing the pilose to glabrous lamina, adaxial surface glabrous or with few scattered sessile glands, or rarely, with numerous gland-tipped septate hairs, abaxial midrib usually with spreading cottony hairs near base, sometimes wholly glabrous. Capitula initially aggregated in globose heads c. 5–10 mm diam (c. 5–14 capitula per head), but these usually growing out into subspicate, monoehasial occasionally scorpioid cymes to 1.8 cm long. If capitula remaining in head-like infructescences, then not wholly obscured by cottony hairs and the herbaceous bracts quite obvious. Individual capitula eupular, 2.3–3.0 mm long, 2.1–3.1 mm diam.; bracts in 2–3(–4) series, outer bracts flat, elliptic, herbaceous, subequal to or slightly exceeding capitulum; medial bracts obovate or broadly elliptic, 1.3–2 mm long, moderately to densely cottony, eglandular or with very few glands, herbaceous for the greater part but membranous toward the apex; apex truncate-ruminant, ciliate, not recurved; inner bracts obovate, as long as capitula, entirely membranous or with a narrow central stereome, eglandular or sparsely glandular around middle, sparsely pilose or glabrous, apex ciliate. Florets 20–50 per capitulum, slightly exceeding involucre at maturity; tubular part of corolla 0.8–0.95 mm long, with scattered glands and cottony hairs concentrated proximally; lobes spreading or recurved, 0.3–0.45 mm long; anthers 0.05–0.08 mm long. Cypselas obovoid, truncate or slightly depressed at apex with a short apiculum, 0.45–0.55 mm long, c. 0.3 mm diam. (Figs 2b, 4).

Representative specimens (86 specimens examined): WESTERN AUSTRALIA. South Lake Hopkins, 9.x.1978, *P.K. Latz 7992* (DNA, PERTH). NORTHERN TERRITORY. 3 miles [5 km] E of Victory Downs Homestead, 18.ix.1968, *A. Nicholls 932* (NT); Peterman Range Reserve, 28 km SW from Lingstone Pass, 12.ix.1978, *T.S. Henshall 2213* (AD, CANB, NT); Lake Neale, 28.viii.1973, *P.K. Latz 4249* (NT); Curtin Springs Station, 17.ix.1974, *P.K. Latz 5669* (DNA, NT); Palmer Valley Station, 6.ix.1978, *P.K. Latz 7975* (NT); 3 km SSW of Kulgera, beside Stuart Hwy, 15.ix.1978, *W.R. Barker 3523* (AD); 280 km N of Cadney Homestead, 28.x.1989, *B. Nordenstam & A. Anderberg 901* (AD, MEL, S); 11 km ESE Lyndavale Hmsd., 1.x.1998, *P.K. Latz 15702* (MEL, NT); 15 km SW Idracowra Hmsd, 13.viii.2000, *D.E. Albrecht 9384* (NT); c. 0.3 km N Sputnick Bore, Umbeara Stn, 3.viii.2001, *D.E. Albrecht 9954*, (NT); Murphys Range, 12.viii.2000, *D.E. Albrecht 9351* (NT). SOUTH AUSTRALIA. Charlotte Waters, 1889, *W. Schwartz s.n.* (MEL); Warrina, 1890, *Mrs Richards s.n.* (MEL); Ernabella, viii.1944, *L.B. Young s.n.* (MEL); 17 miles [27 km] east of Coward Springs, 27.ix.1960, *R. Filson 3268* (MEL); Edge of Lake Phillipson, 10.ix.1978, *B. Lay 1433* (AD, MEL); Nunns Bore, 25 km E of William Ck, 13.viii.1985, *F.J. Badman 1793* (AD, MEL); Gammon Ranges, toward Lake Callabonna, 11.viii.1989, *R. Bates 20132* (AD); 93 km S of Cooper Pedy, 27.x.1989, *B. Nordenstam & A. Arneberg 856* (AD, MEL, S).

Distribution and Conservation Status: Known generally from central Australia (far-eastern central Western Australia, southern Northern Territory and northern South Australia within IBRA regions Central Ranges, Finke, Stony Plains and Simpson Strzelecki Dunefields (Environment Australia 2000). (Fig. 1). Not regarded as rare or threatened *sensu* Briggs & Leigh (1996). Regarded as of 'Least Concern' (LC) *sensu* IUCN (2001).

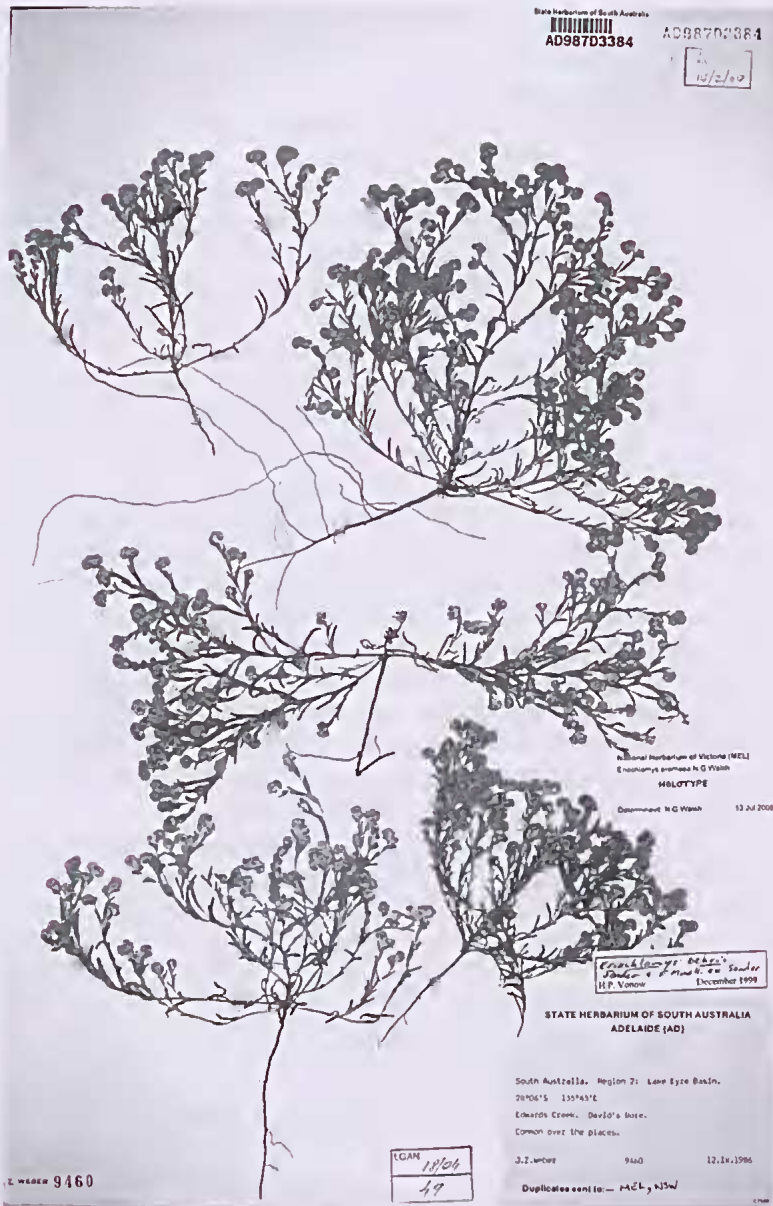


Figure 4. Holotype of *Eriochlamys eremaea*

Habitat: Apparently occurs principally on sandy soils, on dunes, but often also near claypans and along ephemeral watercourses. Also noted from gibber plains. Associated species recorded by collectors include *Zygochloa paradoxa* (R. Br.) S.T. Blake, *Schoenia cassiniana* (Gaudich.) Steetz, *Gnephosis eriocarpa* (F. Muell.) Benth., *Rhodanthe moschata* (A. Cunn. ex DC.) Paul G. Wilson, *Eragrostis dielsii* Pilg., *Sclerolaena* R.Br. spp., *Atriplex* L. spp., *Nitraria billardierei* DC., *Frankenia* L. spp., *Acacia* Mill. spp., *Hakea leucoptera* R. Br.

Phenology: Flowers mainly July to September.

Notes: Distinct from other members of the genus in the smaller corolla tube, the larger leaves and the strong tendency for the inflorescence to clongate so that capitula are arranged spike-like along the stem, and in the strongly eremaeen habitat. The latter feature is the source of the epithet (Greck, *eremia* = desert).

3. *Eriochlamys squamata* N.G. Walsh sp. nov.

Eriochlamys sp. *A sensu* E.A. Brown in G.W. Harden (ed.), *Fl. New South Wales* 3: 253 (1992); *Eriochlamys* sp. *1 sensu* J.A. Jeanes in N.G. Walsh & T.J. Entwisle (eds), *Fl. Victoria* 4: 807 (1999).

Eriochlamys behrii var. *uuiceps* F. Mueller *in sched.* (MEL 85358, 'Murray Desert', s.d.)

A *E. behrii* capitulo solitario vel laxe aggregato non in lana incluso, bracteis capitulorum rhombiformibus vel anguste ovatis differt.

Type: 6 miles [10 km] W of Echuca, 5.vii.1953, *R. Melville* 3907 (holo: MEL; Iso: K (*n.v.*)).

Procumbent or ascending to erect annual, 4–10(–16) cm high, often extensively branched above base and plant then appearing sub-shrubby; stems white-cottony on newer growth, usually glabrescent with age. Leaves linear, 1.5–4(–7) mm long, 0.3–0.6 mm wide, appressed to narrowly spreading from stem, obtuse or rounded, base shortly decurrent, margins revolute, entirely obscuring the abaxial surface, adaxial surface glabrous or, rarely, with scattered sessile glands, abaxial midrib usually with spreading cottony hairs near base. Capitula terminal, solitary or in clusters of up to c. 5, but remaining discrete, campanulate or cupular, 2.5–3 mm long, 2–3.5 mm diam.; bracts in c. 3–6 series, outer bracts c. rhombic or narrowly ovate, broadest about the middle, 1.3–2.2 mm long, resembling the leaves immediately below capitula, but usually considerably shorter and broader than typical stem leaves, usually shortly woolly toward base; medial bracts broadly obovate or broad elliptic, 2–2.5 mm long, moderately to densely cottony, sparsely glandular near middle, margins narrowly to broadly membranous, apex broadly rounded to truncate, ruminant, sometimes recurved, sometimes ciliate; inner bracts broadly obovate, as long as capitula, largely membranous with a narrow central streome, or entirely membranous, sparsely glandular around middle, sparsely pilose or glabrous, apex ciliate or glabrous. Florets 20–40 per capitulum, slightly exceeding involucre at maturity; tubular part of corolla 1.2–1.5 mm long, with scattered glands and cottony hairs concentrated proximally and distally or distal hairs sometimes absent; lobes spreading or recurved, 0.3–0.4 mm long. Cypsela obovoid, truncate or slightly depressed at apex with a short apiculum, 0.5–0.6 mm long, 0.3–0.35 mm diam. (Figs 2c, 5).

Representative specimens (43 specimens seen): NEW SOUTH WALES. Deniliquin, xii.1915, *A. Sinclair* s.n. (MEL); Murrumbidgee, 1875, *T. Macfarland* s.n. (MEL); Barham, s.d., *A.C.F. Gates* s.n. (MEL); Wanganella via Hay, xii. 1903, *E. Officer* s.n. (NSW); Zara via Hay, iii.1904, *E. Officer* s.n. (NSW); Deniliquin, x.1949, *G.A. Crawford* 28 (NSW); 40 km NNE of Moulamein, 18.v.1982, *M. Fox* 8205064 (NSW); Wakool, vii.1935, *A.W.S. Moodie* s.n. (NSW); Hill Plain 11 miles south of Deniliquin, 15.xi.1954, *T. & J. Whaite* 1700 (NSW). VICTORIA. Between Dimboola and Murra Warra, 22.i.1893, *F. Reader* s.n. (MEL, NSW); Jeparit, c. 1916, *S.E. D'Rehor* s.n. (AD); Ouyen, 26.xii.1916, *H.B. Williamson* s.n. (MEL); Galah public watering place, i.1939, *R. Bray* s.n. (NSW); The Range Flora Reserve, 24.x.1979, *A.C. Beaglehole* 65391 (MEL); 10 km west of Lake Charm, x.1984, *T. Lowe* s.n. (MEL); Terrick Terrick Flora Reserve, 24.xi.1985, *A.C. Beaglehole* 82693 (MEL); Wail State Forest, 15.x.1986, *A.C. Beaglehole* 86135 (MEL); West of Sandhill Lake (between Bael Bael and Quambatook), 19.viii.1996, *S. Garner* 319 (MEL).

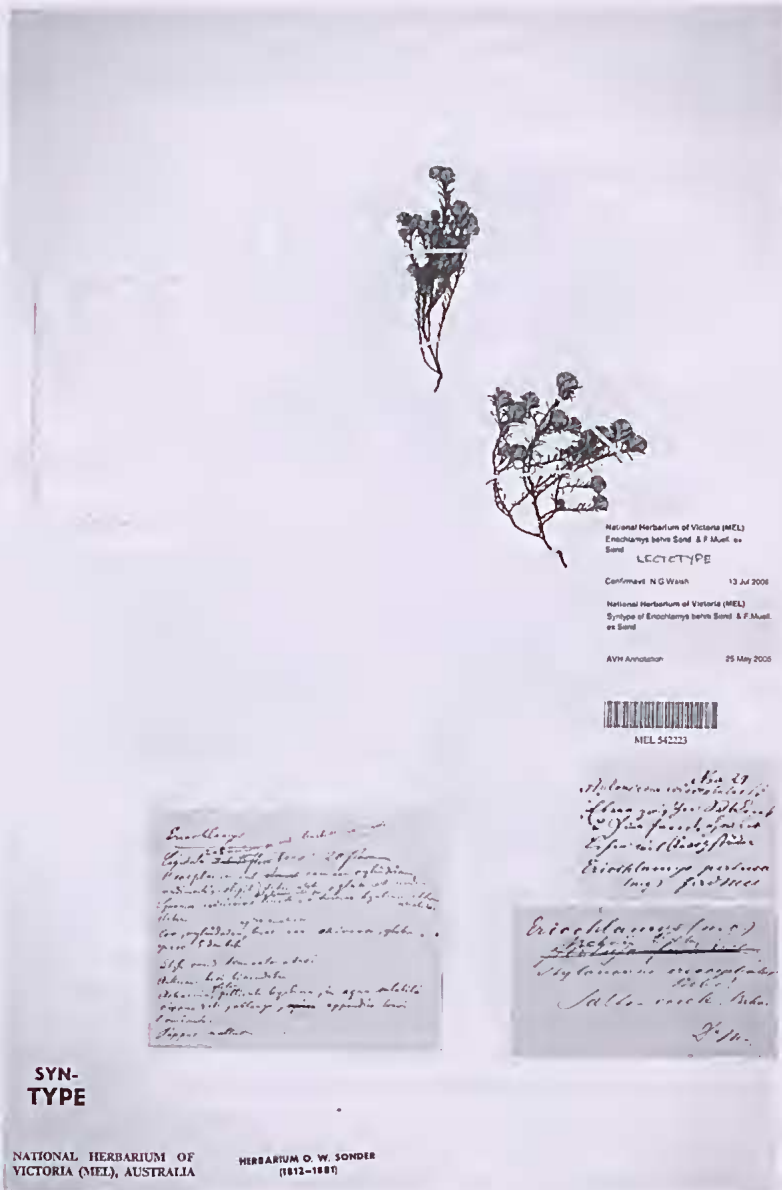


Figure 5. Holotype of *Eriochlamys squamata*

Distribution and Conservation Status: Extends from north-western Victoria through western New South Wales to near Bourke, within IBRA regions Darling Riverine Plain, Cobar Peneplain and Murray Darling Dunefields and Riverina (Environment Australia 2000). No collections have been seed from South Australia, but its presence in that state could be expected. Co-extensive with *E. behrii* through much of its range, but perhaps preferring drier, less saline soils. Partly coextensive with *E. cupularis* in the southern part of that species range, between c. 30° and 31° S. (Fig. 1). Not regarded as rare or threatened *sensu* of Briggs & Leigh (1996). Regarded as of 'Least Concern' (LC) *sensu* IUCN (2001). Note: the map provided for this species in Jeanes (1999) is incorrect.

Habitat: Usually grows in woodland on clay or clayey loam soils, sometimes on raised sandy areas within saline or gypscous flats. Associated species from collectors' notes include *Alectryon oleifolius* (Desf.) S.T. Reynolds, *Casuarina pauper* L.A.S. Johnson, *Rhagodia spinescens* R. Br., 'perennial grasses, low shrubs and prostrate chenopods'. Apparently responsive to disturbance, noted as occurring in an 'overgrazed paddock' (see also note under *E. behrii* relating to the study of Tupper, 1978).

Phenology: Flowers mainly August to January.

Notes: Differs from *E. behrii* in the generally solitary capitula, or these sometimes loosely aggregated in twos and threes but then not embedded in woolly hairs as they are in that species. This species differs from *E. cupularis* in having the outer bracts of the involucre linear and leaf-like and usually as long as or slightly exceeding the capitulum. In *E. squamata* the outer bracts are shorter and relatively broader (decidedly broadest around the midpoint) than the stem leaves, often only c. half as long as the capitulum, and linked to the 'normal' vegetative leaves by a transition sequence along the peduncles. Medial and inner bracts, corollas, receptacles and cypselas are virtually indistinguishable between the two species. Plants of *E. cupularis* are usually more robust and often sub-shrubby. A few collections, mainly around the Pilliga area (here referred to *E. cupularis*) have the outer capitula bracts at the lower end of the range and approach *E. squamata* in this respect. Through the remainder of their ranges though, the distinction between the two species appears to be clear.

Etymology: The epithet (Latin, *squamata* = bearing scales) refers to the series of rhombic or ovate outer bracts that impart a 'scaly' appearance to the capitula.

4. *Eriochlamys cupularis* N.G. Walsh sp. nov.

E. squamatae valde affinis bracteis capitulorum linearibus capitulum subaequantibus vel parum superantibus differt.

Type: 9.8 km W of Boatman Road, ENE of Cunnamulla, *A.R.Bean 14483* (holo: MEL; iso: BRI, NSW (*distribuendi*)).

More or less erect annual, 7–20 cm high, often extensively branched above base and plant then appearing sub-shrubby; stems white-cottony on newer growth, usually glabrescent on older parts. Leaves linear, 2–11 mm long, 0.3–0.8 mm wide, narrowly to widely spreading from stem, obtuse or rounded, base shortly decurrent, margins revolute, entirely obscuring the abaxial surface, adaxial surface glabrous or with few scattered sessile glands, abaxial midrib usually with spreading cottony hairs near base. Capitula solitary and terminal, or more often in monochasial or, sometimes dichasial cymes and then individual capitula sometimes appearing axillary, remaining discrete, cupular, 2.5–3.8 mm long, 2.5–3.5 mm diam.; bracts in 2–3(–4) series, outer bracts linear, subequal to or slightly exceeding capitulum, leaf-like; medial bracts broadly elliptic, 1.5–2.8 mm long, moderately to densely cottony, sparsely glandular near middle (but glands often obscured by hairs), entirely herbaceous or with narrow membranous margins, apex truncate, sometimes recurved, ciliate; inner bracts obovate, as long as capitula, entirely membranous or with a narrow central stercome, sparsely glandular around middle, sparsely pilose or glabrous, apex ciliate or glabrous. Florets 20–50 per capitulum, slightly exceeding involucre at maturity; tubular part of corolla 1.3–2.1 mm long, with scattered glands and cottony hairs concentrated proximally and distally or distal hairs sometimes absent; lobes spreading or recurved, 0.3–0.4 mm long. Cypselas obovoid, truncate or slightly depressed at apex with a short apiculum, 0.55–0.65 mm long, 0.3–0.35 mm diam. (Figs 2d, 6).

Representative specimens (23 specimens examined): SOUTH AUSTRALIA. Between Stokes Range & Coopers Ck, s.d., *Dr Wheeler s.n.* (MEL); 28 km E of Frome Downs HS, 20.xi.1975, *L.D. Williams 7357* (AD). QUEENSLAND. Bowen Downs, 1873, *Birch s.n.* (MEL); e. 39.5 km from Thargomindah toward Cunnamulla, 29.x.1983, *E.M. Canning 6273 & B. Rimes* (BRI, CANB, DNA); Lake Bindegolly, xi.1995, *J. Elstot 24* (BRI). NEW SOUTH WALES: Barrigung, 1884, *W.A. Foyster* (MEL); Bulloo River, 1887, *L. Morton s.n.* (MEL); Yandarlo [Yandaroo], ix.1887, *W. Baenerlen, s.n.* (NSW); Namoi, 1890, *Nilsson 9* (MEL); Brigalow Ck, Wee Waa, iii.1937, *S.C.*



Figure 6. Holotype of *Eriochlamys cupularis*

Sparks s.n. (NSW); Pilliga scrub near Cuttabri, xii.1949, J.A.O'Reilly s.n. (NSW); Bourke, i.1951, W.E.Darley 20 (NSW); Near Brewarrina, 21.xi.1967, D.J. McGillivray 2872 (NSW); Pratts Hut, Brewarrina, 22.ix.1975, D.F.Thompson 2559 (MEL); 40 km S of Pilliga, 1.ix.1986, F. Chalker s.n. (NSW); 22.2 km ENE of Pilliga on the Wee Waa Rd, 8.ix.1986, J.M. Dalby 86/60 (BRI, NSW, PRC); Pilliga East S.F., Old Coghill Rd, x.1985, D.F. Mackay 463 (NSW); Old Coghill Rd, Gilgai Forest Reserve 41, 24.ix.2000, J.R. Hosking 1903 (CANB, MEL, NE, NSW, TARCH).

Distribution and Conservation Status: Extends from central-eastern South Australia into adjacent areas of Queensland and New South Wales within IBRA regions Broken Hill Complex, Channel Country, Mulga Lands and Darling Riverine Plains (Environment Australia 2000). Its distribution overlaps partly with that of *E. squamatus* between c. 30° and 31° S. (Fig. 1). Although known to date by only 23 herbarium specimens, the notes on herbarium sheets would indicate that it is at least locally abundant. Like the other members of the genus it is likely to be not rare or threatened *sensu* Briggs & Leigh (1996) and likely to be of 'Least Concern' (LC) *sensu* IUCN (2001), but further collecting is encouraged so that an accurate assessment of its conservation status may be made.

Habitat: Occurs principally on sand and sandy loam soils, sometimes in areas prone to inundation. Associated species from collectors' notes include *Acacia anemra* F. Muell. ex Benth., *Acacia* spp., *Aristida* L. spp., *Casuarina* R.Br. spp., *Callitris* Vent. spp., *Eucalyptus populnea* F. Muell., *E. crebra* F. Muell, *Grevillea striata* R. Br. *Muehlenbeckia florulenta* McIsn.. Apparently responsive to disturbance — a note on O'Reilly s.n. (NSW) has "known locally as 'insolvency bush' & takes possession of some areas. It seems to be associated with a 'black alkali' condition in the soil", and on Sparks s.n. (NSW) "... known locally as 'eucalyptus weed' ... becoming a very serious pest on the light sandy soils of the Pilliga Scrub ... in some paddocks it is in full possession".

Phenology: Flowers mainly September to November.

Notes: More closely related to *E. squamata* than other members of the genus. See notes under that species (above). The epithet is Latin, meaning 'cup-shaped', and refers to the shape of the capitula which are more distinctly cup-shaped in this species than other members of the genus.

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